

REMARKS

This paper responds to the Office Action mailed on December 22, 2004.

Claims 11, 41, 47, 53 and 59 are amended, no claims are canceled, and no claims are added; as a result, claims 1-12 and 23-64 remain pending in this application.

Objection to the Drawings

The objection to the drawings as not showing every feature of the invention specified in the claims, specifically that “a spacer ... terminating at the boundary wherein the spacer is not in contact with the oxide layer”, as recited in claim 41, is respectfully submitted to be incorrect. The oxide layer is believed to be reference 215 of figures 2B-2D, the spacer is believed to be reference 210 of figures 2B-2C, the reoxidized portion of the spacer, known as the polycide reoxidation, is believed to be reference 220 of figures 2B-2C, the feature is believed to be the electrode reference 205 of figures 2B-2C, and the spacer terminates at the boundary between the feature 205 and the oxide 215 without contacting the oxide 215, as clearly shown in figure 2C at location reference 225, and as discussed in the specification at least at page 5, starting at line 5. In view of the above, Applicant respectfully requests that this objection be reconsidered and withdrawn.

The objection to figure 2C as failing to comply with 37 CFR 1.84(p)(5) as including reference number 220 which is not mentioned in the description is believed to be incorrect. The Preliminary Amendment submitted with the application includes an amendment to the specification on page 5, first paragraph that adds the reference number 220 to the reoxidation of the spacer material. In view of the above, Applicant respectfully requests that this objection be reconsidered and withdrawn. Therefore, Applicant submits that the drawings and the specification are already in compliance with 37 CFR, and that no corrected drawing sheets are required at this time.

§112 Rejection of the Claims

Claim 41 was rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. Applicant has amended the claim to clarify that the spacer terminates adjacent to but not in contact with the oxide layer, and respectfully submits that the claim language is now definite. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

§102 Rejection of the Claims

Claims 1-3, 5, 6, 8-11, 13-22, 25, 27-29, 31, 33-35, 38, 39, 41, 44, 46, 47, 50, 52, 53, 56, 58, 59, 62, and 64 were rejected under 35 U.S.C. § 102(e) as being anticipated by Park et al. (U.S. Patent No. 5,545,578). Applicant respectfully traverses this rejection.

The cited document of Park appears to disclose a method for forming oxidation preventing sidewall on a gate electrode formed of polysilicon 14 and tungsten silicide 16. Prior to etching the poly 14 and silicide 16 layers to form the electrode, a layer of nitride 18 is deposited on the flat conductive gate electrode layers. Then a patterning operation forms the nitride 18, the silicide 16, and a portion of the poly 14 into the eventual gate. The partial etching of the poly 14 is referred to as a silicide layer 16 over etch (see col. 4, line 48 and fig. 4C) and results in a poly step "a". Then a second nitride layer 22 is deposited over the partially formed electrode (references 18a, 16a and partially etched poly 14 in fig. 4D), and the entire device is subjected to an unmasked anisotropic etch back operation that removes the horizontal portions of the second nitride layer 22 from the top of the electrode and the unetched portions of the poly layer 14. Then the remaining unetched portion of the poly 14 is etched using the partially formed electrode as the mask, resulting in a portion of the side wall of the poly 14A being uncovered by the sidewall spacer 22a.

Applicant respectfully submits that independent claim 1 is patentably distinct over Park, at least because claim 1 in part recites "...selectively depositing a first spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of each of the one or more features ...", which feature is not found in Park. Applicant respectfully submits that Park discloses non-selective spacer deposition and may be seen in that the layer 18 covers the entire device in figure 4B, and the second spacer 22 covers the entire device in figure 4D. Therefore, the Park does not disclose each and every feature of the claim.

Applicant respectfully submits that independent claim 6 is patentably distinct over Park, at least because claim 6 recites, in part, “...*selectively depositing a first spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of each of the one or more features ...*”, which feature is not found in the cited Park document. This is true for the same reasons given above with reference to claim 1, specifically that Park does not disclose selective deposition and initially covers the entire wafer, then etches to form the sidewall spacer.

Applicant respectfully submits that independent claim 9 is patentably distinct over Park, at least because claim 9 recites “...*selectively forming a first oxidation barrier comprising silicon nitride or an amorphous silicon film only on the sidewalls of the gate ...*”, which feature is not found in Park. As noted above, the Park reference does not disclose selective depositions, and the eventual barrier is made up of nitride layers 22a on the sidewall, and 18A on the top surface of the electrode.

Applicant respectfully submits that independent claim 11, as amended herein, is patentably distinct over Park, at least because claim 11 recites in part “...*avoiding depositing the thin silicon nitride on the insulating layer disposed above the source and the drain region ...*”, which feature is not found in Park. As discussed above, Park appears to show a blanket deposition and does not avoid depositing the nitride over the source and drain diffusions.

Applicant respectfully submits that independent claim 41, as amended herein, is patentably distinct over Park, at least because claim 41 recites in part “...*forming a spacer comprising silicon nitride or an amorphous silicon film covering the surface of the feature and terminating at a location adjacent to the boundary wherein the spacer is not in contact with the oxide layer ...*”, which feature is not found in Park. Applicant respectfully submits that Park appears to disclose an arrangement where the spacer 22a is in contact with the oxide layer 24 over the source and drain regions, as may be seen at least in figure 4G.

Applicant respectfully submits that independent claim 47, as amended herein, is patentably distinct over Park, at least because claim 47 recites in part “...*forming a spacer comprising silicon nitride or an amorphous silicon film only on a substantially vertical portion of the surface of the feature ...*”, which feature is not found in Park. Park teaches two nitride layers on the sides and top of the electrode.

Applicant respectfully submits that independent claim 53, as amended herein, is patentably distinct over Park, at least because claim 53 recites in part “...*forming a second layer of oxide on the spacer and the first layer of oxide, the second layer of oxide forming a gap at a boundary between the feature and the first layer of oxide* ...”, which feature is not found in Park. Park teaches two nitride layers on the sides and top of the electrode and no second layer of oxide.

Applicant respectfully submits that independent claim 59, as amended herein, is patentably distinct over Park, at least because claim 59 recites in part “...*depositing a spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of the electrode, the spacer extending to and terminating adjacent to a boundary between the first layer of oxide and the sidewalls of the electrode*...”, which feature is not found in Park. Park appears to teach a spacer 22a that contacts the oxide layer 24, as noted above with reference to the previous rejections.

The dependent claims are held to be in patentable condition at least as depending upon base claims shown above to be patentably distinct over the cited reference. In view of the above discussion and amendments, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

§103 Rejection of the Claims

Claims 4, 7, 12, 26, 30, 32, 36, 37, 40, 42, 45, 48, 51, 54, 57, 60, and 63 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Park et al. in view of Hurley (U.S. Patent No. 6,350,780). Applicant respectfully traverses this rejection.

The cited Park reference is discussed above with reference to the previous rejections. The cited reference of Hurley appears to disclose that the problem of incubation periods (see col. 1, lines 27 and 41; col. 2, lines 7 and 33) for different surfaces at the beginning of a nitride deposition may be resolved by use of a pre deposition of at least a monolayer of silicon on the surface of the wafer (see col. 1, line 29; col. 2, lines 42 and 58). After the pre deposition of silicon, the deposition of the nitride layer is at “a substantially equivalent rate independent of the surface type” (see col. 2, lines 53-54). Nothing in Hurley describes or suggests the use of a selectively deposited layer.

Applicant respectfully submits that cited reference of Hurley teaches away from the claimed invention of selectively depositing the spacers on the sidewalls of the electrode features on the device. Applicant submits that the Examiner has not met the burden of showing a reason why one of ordinary skill in the art should make the suggested combination of references.

The Examiner has the burden under 35 USC § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d (BNA) 1596, 1598 (Fed. Cir. 1988). In combining prior art references to construct a *prima facie* case, the Examiner must show some objective teaching in the prior art or some knowledge generally available to one of ordinary skill in the art that would lead an individual to combine the relevant teaching of the references. *Id.*

The M.P.E.P. contains explicit direction to the Examiner that agrees with the *In re Fine* court:

To establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. (citing *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed, Rev.1).

Applicant submits that there is no motivation for one of ordinary skill in the art to combine a reference such as Park having no selective deposition processes and two nitride depositions, with a reference such as Hurley which teaches methods to avoid selective deposition, such as pre deposition of a monolayer of silicon prior to nitride deposition. Therefore, Applicant submits that the suggested combination of references is inappropriate and should be withdrawn.

Further, Applicant submits that even if there were a reason to make the suggested combination, the result would still not disclose or suggest all of the features of the claimed invention. The cited reference of Hurley is not seen as correcting the failures of the Park reference. Specifically, the suggested combination does not teach the claimed features of having a gap between the sidewall spacer and the oxide, or only having the spacer on the sidewalls of the electrode, as found in the independent claims, as discussed above in the previous rejection.

In view of the above, Applicant submits that claims 4, 7, 12, 26, 30, 32, 36, 37, 40, 42, 45, 48, 51, 54, 57, 60, and 63 are patentably distinct and unobvious over the suggested

combination of references, whether taken alone or in any combination, at least since they depend upon base claims shown above to be patentable over the cited combination. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 23, 32, 37, 42, 48, 54, and 60 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Park et al. in view of Hurley and further in view of Woo et al. (U.S. Patent No. 4,774,201). Applicant respectfully traverses this rejection.

The cited references of Park and Hurley have features discussed above with reference to the previous rejections. The cited reference of Woo is used in the outstanding Office Action to show that silicide reoxidation is known.

Applicant respectfully submits that the cited Woo reference does nothing to correct the deficiencies of the combination of Park and Hurley as discussed above. Specifically, the suggested combination of references does not describe or suggest at least the claimed feature of “...selectively depositing a first spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of each of the one or more features ...”, as recited in claim 1, or the feature of “...depositing a spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of the electrode, the spacer extending to and terminating adjacent to a boundary between the first layer of oxide and the sidewalls of the electrode ...”, as recited in claim 59, as discussed above with reference to the prior rejections.

Claims 23, 32, 37, 42, 48, 54, and 60 are held to be in patentable condition at least as depending from base claims shown above to be patentable over the suggested combination of references. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 24, 33, 38, 43, 49, 55, and 61 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Park et al. in view of Liao et al. (U.S. Patent No. 5,480,830). Applicant respectfully traverses this rejection.

The cited reference of Park has features discussed above with reference to the previous rejections. The cited Liao reference is used in the outstanding Office Action to show that it is known to have an electrode made of undoped silicon.

Applicant respectfully submits that the Liao reference does nothing to correct the deficiencies of the Park reference discussed above. Specifically, the suggested combination of reference neither describes nor suggests at least the claimed features of “...*selectively depositing a first spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of each of the one or more features ...*”, as recited in claim 1, or the feature of “...*depositing a spacer comprising silicon nitride or an amorphous silicon film only on the sidewalls of the electrode, the spacer extending to and terminating adjacent to a boundary between the first layer of oxide and the sidewalls of the electrode ...*”, as recited in claim 59, as discussed above with reference to the prior rejections. The other independent claims have similar claim language

Since neither reference contains any teaching regarding a spacer on the sidewalls, or having the spacer end before it contacts the oxide, then the suggested combination can not provide one of ordinary skill in the art with the claimed invention. The dependent claims are held to be patentable at least as depending upon base claims shown above to be patentable over the suggested combination of references. In view of the above discussion, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, David Suhl, at (508) 865-8211 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

KLAUS F. SCHUEGRAF ET AL.

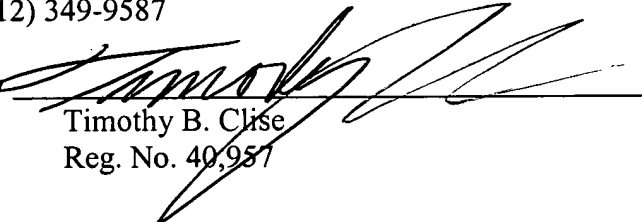
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